WHAT IS CLAIMED IS:

1. (New) An enhanced volume phase grating, comprising:

a substrate;

a transparent cover; and

a volume phase medium between the substrate and the transparent cover, wherein the volume phase medium has a thickness, T, a surface, and a bulk refractive index, the bulk refractive index is periodically modulated in a direction parallel to the surface of the volume phase medium, with a peak value of refractive index equal to $n + \Delta n$, where Δn is the peak modulation of said bulk refractive index and n is a refractive index, the periodic sequence of peak values of said bulk refractive index throughout the thickness of the volume phase medium provides a periodic structure of Bragg surfaces within said volume phase medium with a period, d, where the period, d, satisfies

$$d = \frac{\lambda}{n(\sin\alpha + \sin\beta)},$$

where λ is the nominal free-space wavelength for which said enhanced volume phase grating is designed,

$$\Delta n = \frac{\lambda}{T}\left(\frac{2s-1}{2}\right)\sqrt{(\cos\alpha)\left(\cos\alpha - \frac{\lambda}{nd}\tan\left(\frac{\beta-\alpha}{2}\right)\right)},$$

s is a positive integer satisfying s > p, where p is another positive integer,

θ_i is an arbitrary external angle of incidence, and

β is an internal angle of diffraction that satisfies

$$\beta = \text{either } a\cos\left(\frac{2p-1}{2s-1}\right) - \alpha \quad \text{or} \quad 180 - a\cos\left(\frac{2p-1}{2s-1}\right) - \alpha,$$

where

$$\alpha = a\sin\left(\frac{\sin\theta_i}{n}\right),$$

whereby the S-polarization diffraction efficiency and the P-polarization diffraction efficiency of said enhanced volume phase grating, when illuminated by an incident beam of said nominal free-space wavelength, λ, at said external angle of incidence, θ_i, are simultaneously maximized at a common value of the product ΔnT, simultaneously minimizing insertion loss and PDL.

2. The enhanced volume phase grating of claim 1, wherein said volume phase medium is dichromated gelatin.